28th. Iowa, 11th, 24th, 25th and 29th. Indian Territory and Texas, 1st, 11th, 12th, 17th, 18th, 20th, 24th, 25th, 27th, 28th and 29th. California, on the 10th.

Auroras.—Harvard College Observatory, Cambridge, Mass., looked for every clear evening, none seen; 11th, 20th, 29th, evenings, hazy or cloudy. New Corydon, Ind., 8th, 10 p. m.; Muscatine, Ia., 19th, 7 to 10 p. m.; Gardiner, Me., 1st, 29th; Cumberland, Md., 26th; Starkey, N. Y., 6th, 10th, 20th, 27th, 29th; Pembina, 29th; Eastport, 6th, 7th, (29th, 9 to 11:30 auroral arch 20° in height and extending from NNW. to NNE.

Telegraphic communication interferred with by atmospheric electricity.—Ft. Sill, 12th, 24th; Jacksboro, Tex., 24th; Henrietta, Tex., 24th; Mason, Tex., 27th.

OPTICAL PHENOMENA.

Solar Halos observed in the various districts on the following dates: New England, 4th, 5th, 7th, 8th, 19th, 11th, 18th, 20th, 21st, 22nd, 24th, 25th, 27th. Middle Atlantic States, 1st, 2nd, 6th, 9th, 10th, 11th, 17th, 18th, 20th, 24th, 25th, 27th, 29th. South Atlantic States, 7th, 9th, 25th, 27th, 28th. Eastern Gulf States, 7th, 9th, 11th, 27th, 28th. Western Gulf States, 5th, 6th, 19th, 27th. Lower Lake region, 2nd, 3rd, 5th, 6th, 13th, 14th, 15th, 18th, 20th, 21st, 27th. Upper Lake region, 2nd 9th, 11th, 14th, 15th, 16th, 18th, 29th. Ohio valley, 2nd, 12th, 16th, 22nd, 23rd, 24th. Upper Mississippi valley, 2nd, 3rd, 5th, 15th, 16th, 17th, 18th, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th. Missouri valley, 2nd, 4th, 6th, 10th, 12th, 13th, 14th, 15th, 17th, 20th, 22nd, 24th, 27th, 29th. Rocky Mountains, 6th, 8th, 9th, 10th, 15th, 16th, 17th, 23rd, 27th, 28th. Western Plateau, 8th, 20th, 27th, 28th. California, 8th, 17th, 26th. Oregon, 7th.

Lunar Halos were observed in the various districts on the following dates: New England, 2nd, 20th, 21st, 22nd, 24th, 25th, 27th. Middle Atlantic States, 14th, 16th, 17th, 18th, 20th, 21st, 23rd to 27th. South Atlantic States, 9th, 16th, 17th, 19th, 25th. Eastern Gulf States, 16th, 17th, 18th, 19th, 21st, 23rd to 27th. Western Gulf States, 15th, 17th, 18th, 19th, 20th to 27th, 29th. Lower Lake region, 9th, 12th, 14th, 15th, 16th, 21st, 22nd, 24th. Upper Lake region, 12th, 15th, 16th, 17th, 19th, 20th, 22nd, 25th. Upper Mississippi valley, 14th to 19th, 21st to 29th. Ohio valley and Tennessee, 15th, 16th, 17th, 18th to 25th. Missouri valley, 3rd, 14th, 16th, 17th, 18th, 22nd, 23rd, 24th. Rocky Mountains, 17th, 18th, 19th, 20th, 21st, 22nd. Western Plateau, 17th, 18th, 19th, 21st, 22nd, 25th. California, 25th. Oregon, 18th, 20th.

Mirage.—Oregon, Mo., 9th, 14th; Genoa, Neb., 1st, 2nd, 3rd, 7th, 8th, 29th; Pembina, 5th.

MISCELLANEOUS PHENOMENA.

Sunsets.—The characteristics of the sky at sunset, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service Stations. Reports from 130 stations show 3,745 observations to have been made, of which 32 were reported doubtful; of the remainder 3,110, or 83.8 per cent, were followed by the expected weather.

Meteors.—New Corydon, Ind. 1st, 6th, 7th; Cedar Vale, Kan., 8th; Woodstock, Md., 1st, 16th, 24th, 26th; Fayette, Miss., 13th; Oregon, Mo., 7th, 27th; Waterbury, N. Y., 7th, 14th, 17th; North Volney, N. Y., 28th; Starkey, N. Y., 16th; Boise City, Idaho, 12th, 20th; Madison, Wis., 17th; Rochester, 5th.

Zodiacal Light.—Harvard College Observatory, Cambridge, Mass., looked for every clear evening; distinctly visible on the 2nd, 8th; visible 1st, 4th, 5th, 6th, 7th, 9th; observations on other evenings hindered by moonlight, clouds or haze. Southington, Conn., visible on the 7th and 8th. New Corydon, Ind., on the 1st, 4th, 5th, 7th, 8th 9th, 10th. Muscatine, Iowa, on the 5th and 8th; Cresco, Ia., on the 7th, 8th, 11th, 12th, 29th; Monticello, Ia,, on the 3rd and 9th; Ft. Dodge, Ia., on the 4th and 5th. Cedar Vale, Kan., from the 1st to 9th, 11th, 13th, 14th, 27th, 28th. Somerset, Mass., on the 1st, 4th to 9th, 11th, 27th; Fall River, Mass., on the 1st and 29th. Oregon, Mo., on the 3rd, 5th, 6th, 7th, 8th, 9th, 28th. Austin, Neb., on the 6th. Atco, N. J., on the 1st, 2nd, 3rd, 4th, 6th, 7th, 8th, 9th, 10th, 12th, 16th. Waterburgh, N. Y., on the 1st, 5th, 6th, 7th, 8th, 9th; Starkey, N. Y., on the 25th. Bellefontaine, Ohio, on the 7th, 9th and 19th. Coalville, Utah, on the 3rd and 28th. Wytheville, Va., on the 3rd, 6th and 28th. Woodstock, Vt., seen on clear evenings in the latter part of the month. Lynchburg, Va., on the 3rd, 4th, 6th, 7th. Ft. Whipple, Va., on the 23d. Mr. Ch. Hasselbrink remarks as follows in reference to observations made by him at Havana, Cuba: "February 28th, visible at about 7 p. m.; does not extend more than 30° above the true horizon. The borders or sides of the triangular shape less defined than ever; has at times the appearance of a mass of dust illumined by some source of light; not constant; intensity varies at intervals; real intermittence. The inclination on the horizon is not considerable. The axis approaches the perpendicular and forms with the horizontal line an angle of about 80 degrees; commences vanishing at about 8 p. m. February 29th, not visible; western region cloudy."

Polar Bands.—New Corydon, Ind., 9th, 16th, 20th and 27th; Guttenburg, Ia., 22nd; Yates Center, Kan., 17th; Gardiner, Me., 8th, 21st, 22nd, and 25th; Thornville, Mich., 22nd; Auburn, N. H., 3rd and 27th; Freehold, N. J., 2nd, 12th, and 24th; Vineland, N. J., 28th; Wytheville, Va., 2nd, 6th, 11th and 20th.

Prairie and Forest Fires.—Glenwood, Ia., 23rd; Creswell, Kan., 2nd, 3rd, 5th to 15th, 17th to 29th;

Yates Center, Kan., 18th; Independence, Kans., 4th to 11th, 14th, 17th to 29th; Ft. Sill, 25th; Dodge City, 7th and 9th; Ft. Gibson, 2nd, 4th, 6th, 8th, 9th, 10th, 11th and 22nd; Chattanooga, Tenn., 24th and 25th.

Sun Spots.—The following record of observations, made by Mr. D. P. Todd, Assistant, has been forwarded by Prof. S. Newcomb, U. S. Navy, Superintendent Nautical Almanic Office, Washington, D. C.:

Date—Feb., 1880.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Remarks.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
1st, 10 a. m...	0	5	0	0	0	0	2	14	
2nd, 9 a. m....	0	0	0	0	0	0	2	14	Faculæ.
3rd, 4 p. m	1	3	0	0	1	3	3	11	
4th, 9 a. m....	0	0	0	0	0	0	3	11	
5 p. m....	0	0	0	0	0	0	3	11	Faculæ
5th, 3 p. m....	0	0	0	0	0	0	3	11	
6th, 3 p. m....	0	0	0	0	0	0	3	11	
7th, 2 p. m....	0	0	0	0	0	0	3	11	
8th, 9 a. m....	0	7	0	0	0	0	3	18*	
9th, 2 p. m....	0	0	0	0	0	0	3	18*	
11th, 3 p. m....	0	0	2	11	0	0	1	8	
14th, 8 a. m	0	0	1	8	0	0	0	0	Several extensive fields of faculæ. Spots probably disappeared by solar rotation.
21st, 3 p. m....	1	3	0	0	1	3	1	3	
22nd, 11 a. m..	0	3	0	0	0	3	1	6	
23rd, 9 a. m....	0	0	0	0	0	0	1	6	
24th, 8 a. m....	0	0	0	0	0	0	1	3	
4 p. m	0	0	0	0	0	0	1	3	
25th, 9 a. m....	0	3	0	0	0	0	1	6	
26th, 3 p. m....	0	0	0	0	0	0	1	1	
27th, .2 m.....	0	0	0	0	0	0	1	1	
29th, 12 m.....	1	1	0	0	0	0	2	2	Several broad areas of faculæ.

*Approximated.

Mr. Wm. Dawson, at Spiceland, Ind., reports: "1st, a large group of 12 spots in NE. quadrant, one large spot south of the group; both group and spot 4′ from E. edge; 3rd, 3 groups, 18 spots; one new spot at E. edge; 4th, 3 groups, 8 spots; 5th, 3 groups, 8 spots; 6th, 3 groups, 22 spots; 8th, 4 groups, 15 spots; 10th, 4 groups, 25 spots; 15th, no spots; 20th, one spot very close to edge; 21st, 3 spots near E. edge; 22nd, 3 spots, 1 group; 24th, 6 spots, 1 group; 26th, 1 large spot and 2 little ones near it, nearly S. of centre." Mr. F. Hess, at Ft. Dodge, Ia., reports: 1st, noon, 2 groups in NE. quadrant—upper, 2 large and 10 or 12 small spots and faculæ; lower, 1 large spot and faculæ; 2nd, 9 a. m., same—in all, 3 large and 6 small spots, no faculæ; 3rd, 9 a. m., same, and a large new spot near NE. limb and 1 in SE. quadrant and faculæ; 4th, no sun all day; 5th, 9 a. m., two large and one small spot in NW. quadrant, one large spot in SW. quadrant, one large spot in NE. quadrant and faculæ; 6th, 9 a. m., same four large spots and several small ones—nothing new since yesterday; 7th, 9 a. m., same four large spots nearer to W. limb—nothing new; 8th, 10 a. m., four groups, 3 in NW. quadrant, 1 in SW. quadrant; 9th, 10 a. m., five groups, 4 in NW. quadrant, 1 in SW. quadrant—in all 15 distinct spots and many faculæ; 10th, 10 a. m., same five groups of 15 spots—3 spots very large; 11th, 10 a. m., only 6 spots; first two groups have disappeared by rotation; 12th, 10 a. m., four large and seven small spots and many faculæ in NW. quadrant; 13th, 10 a. m., one large and five small spots, a new group of faculæ near E. limb; 14th, 10 a. m., no spots, but two groups of faculæ near NE. and NW. limbs; 15th to 20th, no spots or faculæ; 21st, noon, one large spot and brilliant faculæ near SE. limb; 22nd, noon, one large spot and 2 distinct smaller ones besides a number of others indistinct; 23rd, noon, one large spot and two smaller ones, no faculæ; 24th, noon, same as on previous day; 25th, no observation made; 26th, 8. a. m., same group near centre E. and W., nothing new; 27th and 28th, no observations; 29th, noon, one large spot in SW. quadrant and a group of faculæ near SE limb.

NOTES AND EXTRACTS.

[*Nature, February* 5, 1880.]

Results of an Inquiry into the Periodicity of Rainfall.—Mr. G. M. Whipple, the author, has collected the following series of rainfall observations, all of which contain more than fifty years' records:

Station.	Periods.	No. of years.	Authority.
Paris	1689–96, 1699–1754, 1773–97, 1804–75.	161	Annuaire de l'Observatoire de Montsouris, 1879.
Padua	1725 to 1878	154	MSS. from P. Denza.
England (Symons' table)	1726 to 1865	140	B. A. Report. 1866.
Milan	1764 to 1878	115	MSS. from P. Denza.
London	1813 to 1878	66	Dines and Symons.
Madras	1813 to 1877	65	NATURE, vol. xviii, p. 565.
Philadelphia	1810 to 1867	58	Smithsonian Tables, p. 97.
Edinburgh	1822 to 1878	57	NATURE, vol. xviii, p. 97.
New Bedford	1814 to 1867	54	Smithsonian Tables, p. 90.
Rome	1825 to 1878	54	MSS. from P. Denza.

To these he added an eleventh, forming a series by combining together the annual rainfall for 1822 to 1875 at London, Paris and Edinburgh, which increased the total number of years of observation to 978.

These he has discussed after a method described at length in the paper, and determined for every series the curves which represent the variation in the means of the amount of annual rainfall for each of the years